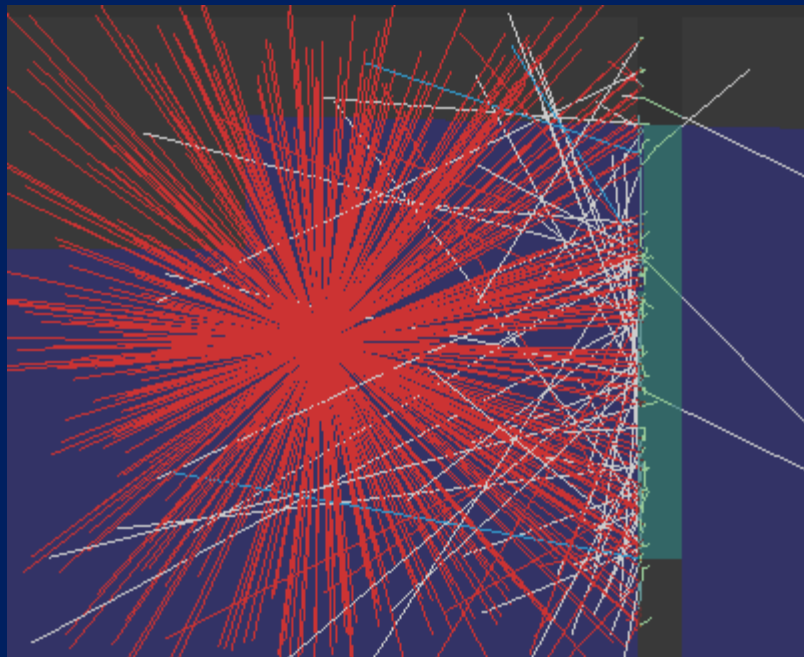
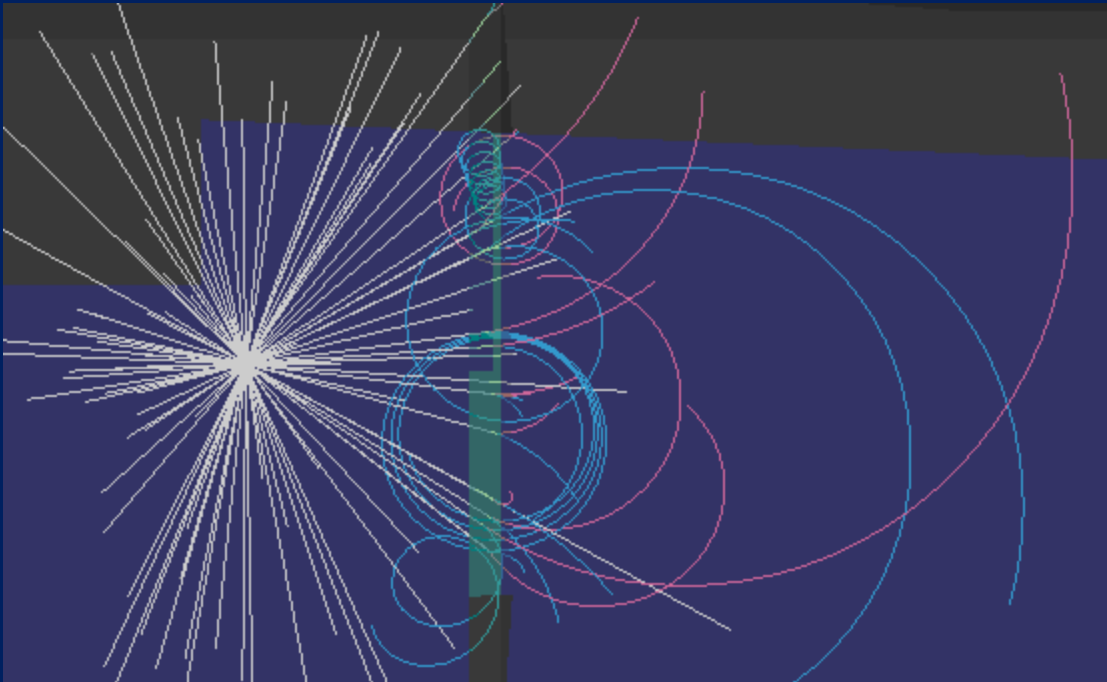


Particle Interaction with Matter - Simulation (PIMS)



Example 1: Virtual Cloud Chamber



In this example, electron-positron pairs are created through the interaction of 10 MeV gamma photons incident on lead. By “switching off” the electron and positron energy loss mechanisms, the charged particles are seen to spiral in the applied magnetic field. Information on the energies of the electrons and positrons can be obtained from the diameter of the trajectory in the magnetic field.

Parameters used in the simulation (in addition to default values):

Medium = Vacuum, Source diameter = 0 (point source)

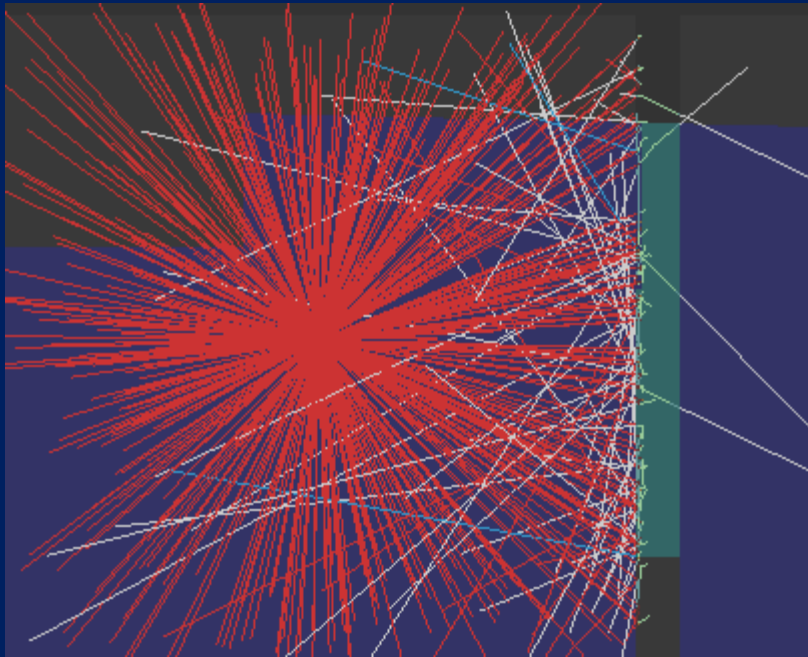
Source to shield distance = 20 cm

Type of particle = photon, Energy of particle = 10 MeV

Number of particles = 100, Magnetic field = $B_z = -0.1$ tesla

Electron and positron interaction mechanisms (ionization, Bremsstrahlung, scattering, annihilation) all "switched off"

Example 2: Shielding of High Energy Radiation



In this example, 3 MeV positrons (red) from the radioactive source are blocked by a lead shield (green). When the positrons collide with the shield, they combine with electrons (blue) to create gamma radiation (white). Only a few gamma photons pass through the shield material. In this simulation the following parameters were used:

Parameters used in the simulation (in addition to default values):

Medium = Vacuum

Source diameter = 0 (point source)

Type of particle = positrons

Energy of particles = 3000 keV

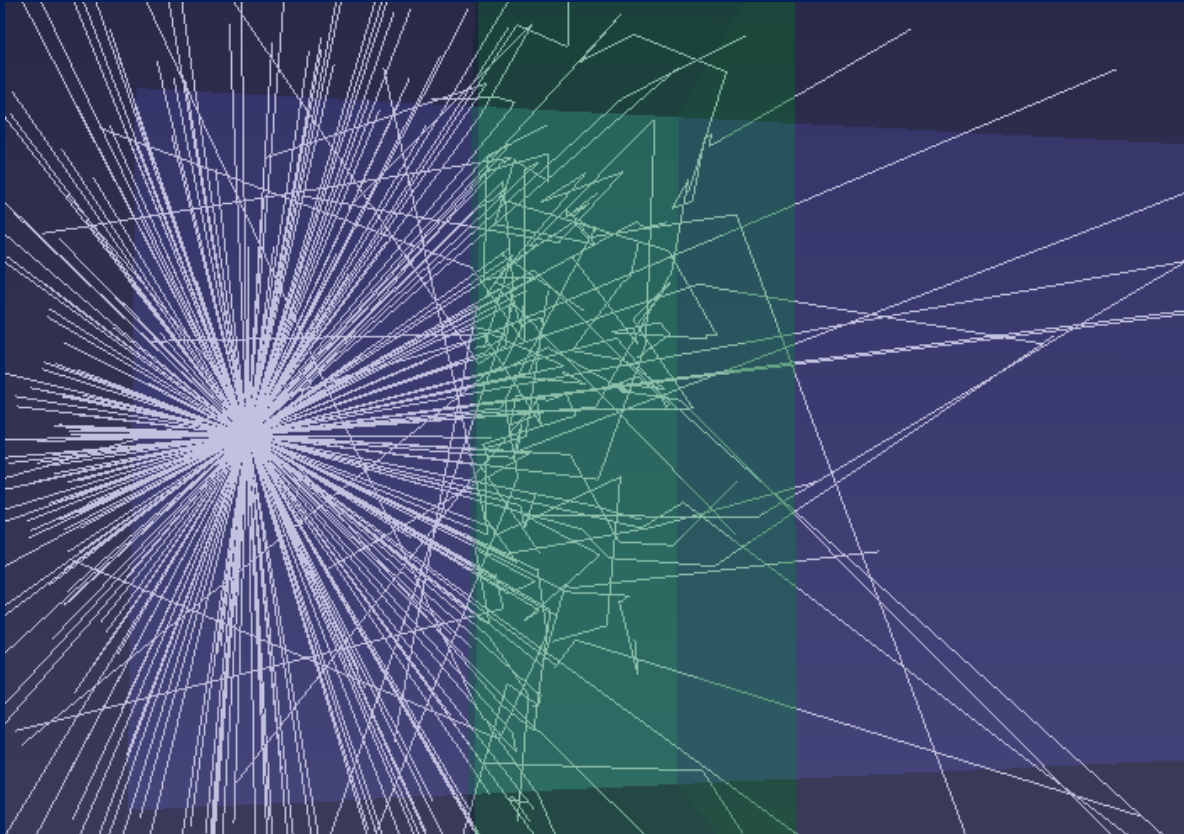
Number of particles = 1000

Source shield distance = 20 cm

Shield thickness = 3 cm

All photon, electron and positron interaction mechanisms "switched on"

Example 3: Photon Multiple Scattering



In this example, low energy photons (energy 100 keV) are attenuated with a thick (15 cm) water shield. This combination of low energies and thick shields give rise to multiple scattering of the radiation.

Parameters used in the simulation (in addition to default values):

Medium = Vacuum, Source diameter = 0 (point source)

Source to shield distance = 20 cm

Type of particle = photon, Energy of particle = 100 keV

Number of particles = 300, Magnetic field = $B_z = 0$ tesla